

# FRESHWATER CLADOCERANS (CRUSTACEA: BRANCHIOPODA) OF THE WETLANDS OF INDIAN BOTANICAL GARDEN, HOWRAH, WEST BENGAL<sup>1</sup>

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(With one text-figure)

**Key words:** Cladoceran fauna, Indian Botanical Garden, West Bengal India

The Indian Botanic Garden located on the northern bank of the river Hooghly, Howrah district, West Bengal consists of twenty-five wetlands of varying sizes. To study the Cladoceran fauna, four perennial lakes and ponds were selected. The survey was repeated for three different periods: April 1994, September 1994 and March 1995. Of the 38 species of Cladocera, belonging to 6 families and 24 genera, recorded in the present study, three are new records to West Bengal and one — *Diaphanosoma leuctenbergianum*, is a new record to India. All the four species have been described in detail to facilitate identification. Except for a few species of Cladocera, most Chydorids occur in wetlands with specific macrophytes. The association between Cladocera and macrophytes suggests a specific interrelationship, which is yet to be established.

## INTRODUCTION

The Indian Botanic Garden located on the northern bank of the River Hooghly, Sibpur, Howrah district, West Bengal, is a unique repository of valuable and rare plant species, with a mosaic of twenty-five wetland areas covering 11 ha. These lakes are interconnected by an operational subterranean flushing system linked with the Hooghly river on the southeast (Fig 1). The physico-chemical nature of these wetlands and their effects were studied by Singh and Ghosh (1985). An attempt to study the fauna of the wetland has been initiated by the Botanical Survey of India and the Zoological Survey of India, under the directive of the Ministry of Environment & Forests. Of these twenty-five wetlands, most of the perennial lakes are used for fish culture regularly. To study the biodiversity of the wetlands, four perennial fish culture lakes and temporary ponds each were selected. The

diversity of crustacean zooplankton, especially Cladocera, is being dealt with here.

## MATERIAL AND METHODS

A total of 8 wetlands, four perennial (fish culture) lakes: 1) Dhobi 2) Kings 3) Leeram and 4) Prain lake and four temporary ponds: 1) Sector 12 pond, 2) Lotus pond at sector 11, 3) Sector 9 pond and 4) Sector 8 pond were selected for the present study (Fig. 1). Three surveys were conducted in different seasons: April 19-22, 1994, September 27-30, 1994 and March 8-10, 1995. All the perennial lakes and temporary ponds harbour macrophytes such as *Eichhornia crassipes* and *Microcystis auriginosa* among others. The electrical conductivity was 1530 to 5200  $\mu$  mhos and the pH 8.2-8.7. Aquatic plants harbour a variety of fauna, including zooplankton such as Cladocera. The zooplankton samples were collected using a hand net (45 cm diameter) and a throw net (45 cm diameter) with muslin cloth (120  $\mu$  mesh size). The net was dragged through the macrophytes, slightly agitating the water column without stirring the mud. Samples

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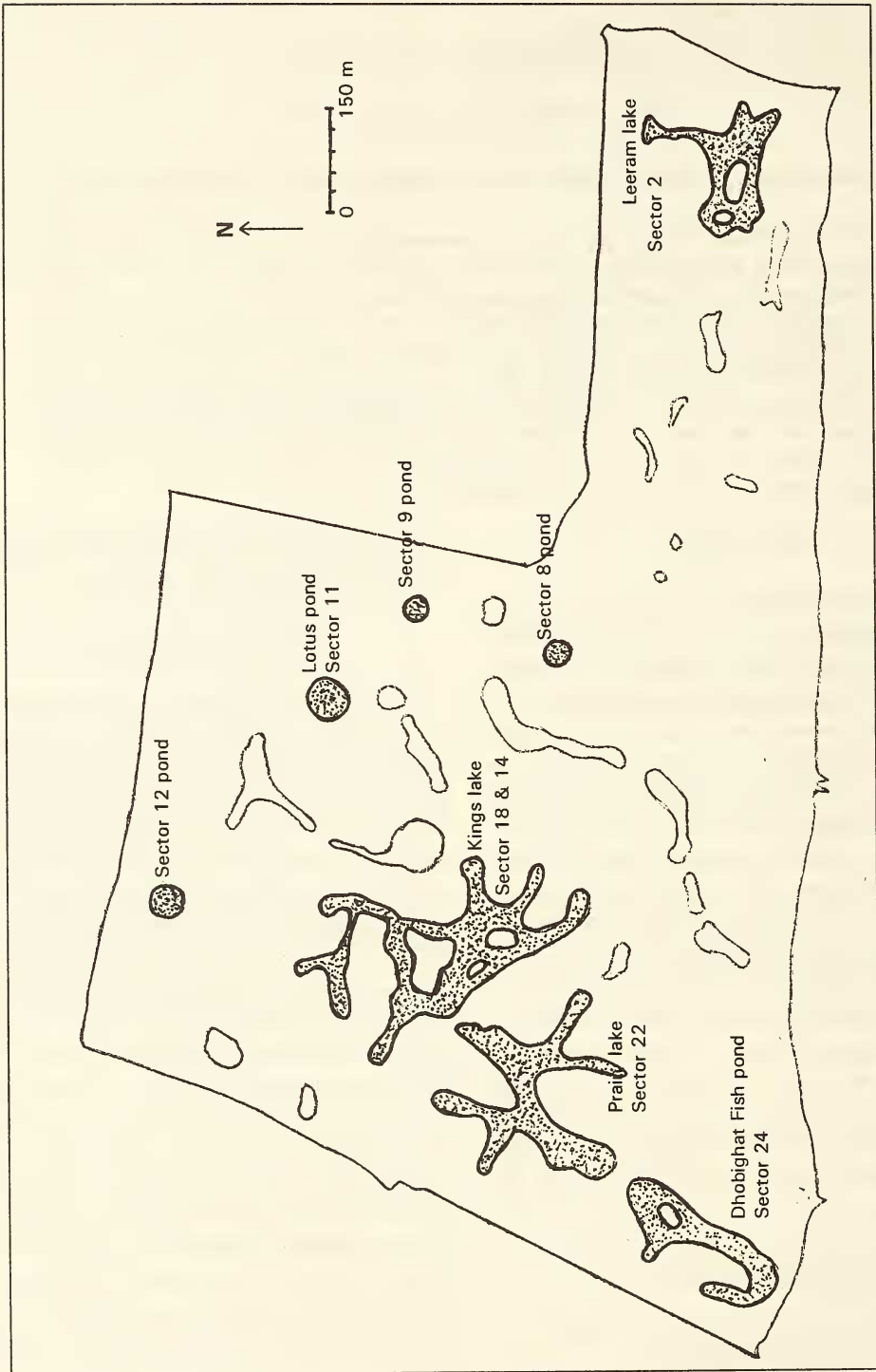


Fig. 1: Map of wetlands of Indian Botanical Garden showing the Cladocera collection spots

were preserved in the field and the Cladoceran species were identified as per Michael and Sharma (1988) using a monocular microscope in the laboratory.

## RESULTS

A total of 38 species of Cladocera belonging to 6 families and 21 genera were recorded in the present study (Table 1). Species such as *Pseudosida bidentata* Herrick, 1884, *Latonopsis australis* Sars, 1888, *Diaphanosoma volzi* Stingelin, 1905, *Diaphanosoma leuchtenbergianum* Fischer, 1854, *Moina brachiata* (Jurine, 1820) *Bosmina longirostris* (O.F. Muller, 1776), *Pleuroxus similis* Vavra, 1900, *Alonella excisum* (Fischer, 1854), *Chydorus ventricosus* Daday, 1898, *Dadaya macrops* Daday, 1898, *Alona kwangsiensis* Chiang, 1963 and *Notalona globulosa* Daday, 1898 were found to occur only during one survey or in one wetland. The rest of the cladocerans were recorded during two surveys or in more than two wetlands. Among all the species, *Ceriodaphnia cornuta* Sars 1885 was found during all the three surveys in seven wetlands and *Diaphanosoma excisum* Sars 1885, *Macrothrix spinosa* King, 1853, *Chydorus sphaericus* (O.F. Muller, 1776) and *Alona karua* King, 1853 were recorded in all the three surveys in five wetlands. The following four species are new records for West Bengal:

### *Diaphanosoma volzi* Stingelin, 1905

**Material examined:** Several females from Lotus pond (Sector 2, 27.ix.1994).

**Female:** Body size: 0.73 mm. Head rounded and small, eye relatively large. Carapace straight on ventral margin, duplicature forming a wide angle, posteroventral corner rounded without denticles except for a long spine on the posterior margin. Postabdomen with three long and sharp pointed basal spines.

**Remarks:** New record to West Bengal. The material collected in the present study agrees with the description of *D. aspinosum* by Chiang (1956) from China and by Idris (1983) from Malaysia.

### *Diaphanosoma leuchtenbergianum*

Fischer, 1854

**Material examined:** Several females from Dhobighat fish pond (Sector 24, 8.iii.1995).

**Female:** Body size: 1.20 mm. Head large, without rostrum. Eye large, situated close to the ventral margin. Carapace almost oblong in outline, posterior end abruptly truncate. Posterodorsal corner of valves almost ending in a right angle. Posteroventral corner with variable number of cilia followed by delicate cilia. Antenna reaching beyond the posterior margin of valve. Postabdomen narrow with fine setules. Claw with three basal spines, decreasing in size proximally.

### *Moina brachiata* (Jurine, 1820)

**Material examined:** Several females from Lotus pond (Sector 2, 27.ix.1994).

**Female:** Body size: 1.27 mm. Head large with medium sized eye situated closer to the dorsal margin than to the ventral side. Antennules long with sensory setae located at 1/3 the distance from head. Carapace almost round with distinct reticulations. Ventral margin of valves with long and short setae increasing in size posteriorly. Postabdomen large with long bidentate tooth and 13 feathered teeth. Claw with large pecten of 10 to 14 teeth.

### *Alona kwangsiensis* Chiang, 1963

**Material examined:** Several females from Dhobighat Fish pond (Sector 24, 27.ix.1994).

**Female:** Body size: 0.45 mm. Shape oval in outline, maximum height slightly before middle from anterior end. Valves with a series of setae, distinct lines and polygonal patterns.

FRESHWATER CLADOCERANS (CRUSTACEA: BRANCHIOPODA)

TABLE 1  
OCCURRENCE OF CLADOCERANS OF INDIAN BOTANICAL GARDEN WETLANDS, HOWRAH

Sl. No.	Name of the Species	WETLANDS							
		N1	N2	N3	N4	N5	N6	N7	N8
ARTHROPODA									
CRUSTACEA									
CLADOCERA									
FAMILY: SIDIDAE									
1.	<i>Pseudosida bidentata</i>	-	-	-	-	-	-	-	1,2
2.	<i>Latonopsis australis</i>	-	-	-	-	-	-	-	1
3.	<i>Diaphanosoma excisum</i>	2	-	-	-	1,2,3	3	1,2	3
4.	<i>Diaphanosoma sarsi</i>	2	-	-	-	3	1,3	-	2
5.	<i>Diaphanosoma brachyurum</i>	-	-	-	-	-	-	1	2,3
6.	<i>Diaphanosoma volzi*</i>	-	2	-	-	-	-	-	-
7.	<i>Diaphanosoma leuctenbergianum**</i>	-	-	-	3	-	-	-	-
FAMILY: DAPHNIIDAE									
8.	<i>Simocephalus vetulus</i>	-	-	-	3	3	3	-	1,3
9.	<i>Simocephalus exspinosus</i>	-	1	-	-	-	1	-	-
10.	<i>Simocephalus serrulatus</i>	-	-	-	-	3	-	-	3
11.	<i>Ceriodaphnia cornuta</i>	1,2	-	2	1,2	2,3	2,3	1	3
12.	<i>Scapholeberis kingi</i>	-	-	-	-	-	-	1	3
FAMILY: MOINIDAE									
13.	<i>Moina micrura</i>	-	-	-	3	3	3	1	-
14.	<i>Moina brachiata*</i>	-	2	-	-	-	-	-	-
FAMILY: MACROTHRICIDAE									
15.	<i>Macrothrix spinosa</i>	-	1	2	3	-	2	-	3
16.	<i>Macrothrix triserialis</i>	-	1	2	-	2	-	-	-
17.	<i>Ilyocryptus spinifer</i>	-	-	-	-	-	1	-	1
FAMILY: BOSMINIDAE									
18.	<i>Bosmina longirostris</i>	-	-	-	2	-	-	-	-
FAMILY: CHYODORIDAE									
Subfamily: Chydorinae									
19.	<i>Pleuroxus similes</i>	-	-	-	-	-	-	-	1
20.	<i>Alonella excisum</i>	-	-	-	-	-	-	-	3
21.	<i>Chydorus sphaericus</i>	-	1,2	-	2	2	3	-	1,2,3
22.	<i>Chydorus barroisi</i>	-	-	-	2	2	-	-	2
23.	<i>Chydorus reticulatus</i>	-	-	2	-	-	3	-	1,3
24.	<i>Chydorus ventricosus</i>	-	-	-	-	-	-	-	1
25.	<i>Dunhevedia crassa</i>	-	-	-	1,2,3	2	1,3	-	1
26.	<i>Pseudochydorus globosus</i>	-	-	-	2	-	-	-	1
27.	<i>Camptocercus australis</i>	-	-	-	2,3	2	-	-	-
28.	<i>Dadaya macrops</i>	-	-	-	-	2	-	-	-

TABLE 1 (contd)  
OCCURRENCE OF CLADOCERANS OF INDIAN BOTANICAL GARDEN WETLANDS, HOWRAH

Sl. No.	Name of the Species	WETLANDS							
		N1	N2	N3	N4	N5	N6	N7	N8
Subfamily: Aloninae									
29.	<i>Alona karua</i>	-	1	-	3	1,2	1,3	1	1,2,3
30.	<i>Alona pulchella</i>	-	-	-	2	-	-	1	3
31.	<i>Alona verrucosa</i>	-	-	-	2,3	2	-	-	1,3
32.	<i>Alona costata</i>	-	-	-	2	-	3	-	-
33.	<i>Alona kwangsiensis</i> *	-	-	-	2	-	-	-	-
34.	<i>Alona davidi</i>	-	-	-	2	2	-	-	2
35.	<i>Alona rectangula</i>	-	-	-	3	2	-	-	3
36.	<i>Kurzia longirostris</i>	-	-	-	2	-	-	-	3
37.	<i>Oxyurella singalensis</i>	-	3	-	-	-	-	-	1,3
38.	<i>Notalona globulosa</i>	-	-	-	-	-	-	-	1

1 = April 1994, 2 = September 1994, 3 = March 1995 Surveys

N1 = Sector 12 Pond; N2 = Lotus Pond; N3 = Sector 9 Pond; N4 = Dhobighat Fish Pond; N5 = Prain lake; N6 = Leeram lake; N7 = Sector 8 Pond; N8 = Kings lake. (\* New record to West Bengal; \*\* New record to India)

Ventral margin of valves with a series of setae, posteroventral corner rounded with five denticles attached marginally up to one third of the posterior region, followed by a row of small spines running the apex of rostrum. Postabdomen with distinct preanal and postanal corners and obtusely rounded dorsal margin. About 7-8 denticles attached submarginally followed by 3 groups of spines along the anal groove up to the preanal corner.

#### DISCUSSION

Out of the 38 species of Cladocera collected during the present study, four species namely *Diaphanosoma volzi*, *D. leuctenbergianum*, *Moina brachiata* and *Alona kwangsiensis* were reported for the first time from West Bengal while *D. leuctenbergianum* is a new record from India. Venkataraman (1993) recorded 57 species of Cladocera from West Bengal, which is more than half the number recorded in India (93 species, Michael and Sharma 1988).

In the present study, the occurrence of all the cladoceran species except *Diaphanosoma excisum*, *D. brachyurum*, *D. leuctenbergianum*,

*Ceriodaphnia cornuta*, *Moina micrura*, *Bosmina longirostris* and *Ilyocryptus spinifer* with specific macrophytes suggests a mutual relationship. Even though a specific association between cladocerans and aquatic macrophytes is yet to be established, Synerholm (1974) observed that the diversity of Cladocera is affected by the presence or absence of these plants. Moreover, Whiteside and Hermsworth (1967), and Quade (1969) considered that the distribution of Cladocera is controlled by habitats and macrophytes rather than by lake types. However, Freyer (1968) has stressed the importance of the relationship between aquatic macrophytes and feeding habits, morphology and distribution of Cladocera. Such a trend was observed in the present study where species of *Simocephalus* were always found to attach themselves, by their anterodorsal carapace, to the leaf or stem of the aquatic plant *Hydrilla* sp. and filter the food particles present in the water. Likewise, many other species of chydorids were found to associate with a variety of aquatic macrophytes *Eichhornia crassipes*, *Pistia stratiotes*, *Lemna* sp., *Nymphaea* sp., *Nelumbo* sp., *Ceratophyllum demersum*, *Vallisneria spiralis*, *Hydrilla* sp.,

*Colocasia* sp. etc. which are to be completely understood.

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REFERENCES

- CHIANG, S.C. (1956): Some species of *Diaphanosoma* (Cladocera) from Wuchang, China. *Acta hydrobiologia Sinica* 2: 314-312.
- FREYER, G. (1968): Evolution and Adaptive Radiation in the Chydoridae (Crustacea: Cladocera): A study in comparative Functional Morphology and Ecology. *Phil. Trans. Roy. Soc. Lond. (B)* 254: 223-385.
- IDRIS, B.A.G. (1983): Freshwater Zooplankton of Malaysia (Crustacea: Cladocera) Penerbit Universiti Pertanian Malaysia, 153 pp.
- MICHAEL, R.G. & B.K. SHARMA (1988): Fauna of India and Adjacent countries, Indian Cladocera (Crustacea: Branchiopoda: Cladocera) (Ed) Director, Zoological Survey of India, Calcutta. 262 pp.
- QUADE, H.W. (1969): Cladocera fauna associated with aquatic macrophytes in some lakes in northeastern Minnesota. *Ecology* 50: 170-179.
- SINGH, J.N. & M.K. GHOSH (1985): Chemical Nature of Hooghly (Ganga) River water and an assessment of their impact on the Eco-pedon system of Indian Botanic Garden, Howrah. *Bull. Bot. Surv. India* 26(1-2): 45-51.
- SYNERHOLM, C.C. (1974): The Chydorid Cladocera from surface lake sediments in Minnesota and North Dakota. M.Sc. Thesis. University of Minnesota. USA, 73 pp.
- VENKATARAMAN, K. (1993): The freshwater Cladocera of southern West Bengal. *J. Andaman Sci. Assoc.* 9: 19-24.
- WHITESIDE, M.C. & R.V. HERMSWORTH (1967): Species diversity in Chydorid (Cladocera) Communities. *Ecology* 4: 664-667.

